

REMARKS

Favorable reconsideration of the present application is respectfully requested. Claims 1-23 are currently pending in the application. Claims 1, 3, 9-11 and 18-22 have been amended and Claim 23 has been canceled by this Amendment. The Amendment is believed to place all of the pending claims in condition for allowance, which action is respectfully requested.

Submitted concurrently herewith is an Information Disclosure Statement to disclose documents that were cited during examination of the corresponding European patent 1661187.

Claims 3, 11, 19 and 20 are rejected under 35 U.S.C. §112, second paragraph, as being indefinite. Claim 3 has been amended and now recites “a substrate”. Therefore, the Examiner is respectfully requested to withdraw the § 112, second paragraph rejection.

Claims 1, 2, 4-8, 13-17, 22 and 23 are rejected under 35 U.S.C. §103(a) as being unpatentable over U.S. Patent No. 4,836,861 to Peltzer (“Peltzer”) in view of U.S. Patent No. 4,047,518 to Anderson (“Anderson”). Without acceding to the rejection, Claim 1 has been amended to more particularly claim the invention and now recites *inter alia*:

“ . . . the coolant member including a plurality of elements selected from the group, consisting of, bead, rods, bars, and balls of high thermal conductivity material in thermal contact and providing a large surface area for heat transfer and defining a three dimensional labyrinth for conduction of heat therethrough away from the photovoltaic cell via a substantial number of heat transfer pathways formed by the thermally connected elements and a substantial number of coolant flow passages for a coolant that, in use of the module, is supplied to the coolant chamber via the inlet and flows through the coolant member and is discharged from the coolant chamber via the outlet.”

It is apparent that the applied references do not teach or suggest at least this combination of features.

As the Examiner admits, Peltzer does not disclose any design for its forced liquid cooling system. Claim 1 now recites that the coolant member includes a plurality of elements selected from the group, consisting of, bead, rods, bars, and balls of high thermal conductivity material in thermal contact and providing a large surface area for heat transfer and defining a three dimensional labyrinth for conduction of heat therethrough away from the photovoltaic cell via a substantial number of heat transfer pathways formed by the thermally connected elements and a substantial number of coolant flow passages for a coolant that is supplied to the coolant chamber and flows through the coolant member and is discharged from the coolant chamber. Applicant has found that the above-described cell module, which is characterised by a substantial number of heat transfer pathways formed by the thermally contacting beads, rods, bars or balls and the substantial number of coolant flow passages, is capable of extracting significant amounts of heat generated by incident concentrated solar radiation in an economical, efficient and reliable manner. In particular, Applicant has found that the labyrinth structure of the coolant member makes it possible to direct heat energy progressively away from the photovoltaic cell or cells and the beads, rods, bars or balls of high thermal conductivity material and thereafter to the coolant. Thus, the cell module addresses the significant issue that a large portion of incident concentrated radiation on photovoltaic cells of receivers of large scale solar radiation-based electrical power generating systems is not converted to electricity and manifests itself as heat that would normally reduce the efficiency of photovoltaic cells substantially by increasing their operating temperature.

Neither Peltzer nor Anderson, either individually or in combination, teach or suggest “the coolant member including a plurality of elements selected from the group, consisting of, bead, rods, bars, and balls of high thermal conductivity material in thermal contact and providing a large surface area for heat transfer and defining a three dimensional labyrinth for conduction of heat therethrough away from the photovoltaic cell via a substantial number of heat transfer pathways formed by the thermally connected elements and a substantial number of coolant flow passages for a coolant that, in use of the module, is supplied to the coolant chamber via the inlet and flows through the coolant member and is discharged from the coolant chamber via the outlet,” as recited in Claim 1.

Contrary to the Examiner’s assertion, the “Mammut beads” of Anderson are provided “so as to baffle the flow” of the “fluid transfer medium” and “enhance the ability of the cell to expose the fluid to incident radiation,” (*see*, Office Action, page 8, first paragraph) but there is no teaching or suggestion that the Mammut beads or the “plurality of baffles” (*see*, Office Action, page 7, third paragraph) are made “of high thermal conductivity material in thermal contact and providing a large surface area for heat transfer,” as recited in Claim 1. Therefore, the Peltzer and Anderson combination fails to teach or suggest the “the coolant member including a plurality of elements selected from the group, consisting of, bead, rods, bars, and balls of high thermal conductivity material in thermal contact and providing a large surface area for heat transfer and defining a three dimensional labyrinth for conduction of heat therethrough away from the photovoltaic cell via a substantial number of heat transfer pathways formed by the thermally connected elements and a substantial number of coolant flow passages for a coolant that, in use of the module, is supplied to the coolant chamber via the inlet and flows through the coolant member and is discharged from the coolant

chamber via the outlet,” as recited in Claim 1. Therefore, for all of the above reasons the rejection of Claim 1, and Claims 2, 4-8 and 13-17 that depend therefrom, is believed to be overcome. Likewise, for Claim 22, which contains similar recitations as in Claim 1, the rejection is also believed to be overcome.

Claims 9, 10 and 18-20 are rejected under 35 U.S.C. §103(a) as being unpatentable over Peltzer in view of Anderson as applied to Claims 1-8, 13-17, 22 and 23 above, and further in view of U.S. Publication No. 2002/0108743 to Wirtz (“Wirtz”). Claims 9 and 10 depend from Claim 1 and Claim 18 has been amended similar to Claim 1 and Wirtz fails to make up for the deficiencies of the combination of Peltzer and Anderson and also fails to teach or suggest all of the elements of the currently pending Claims. Accordingly, for at least those reasons given above for Claim 1, Applicant believes Claims 9, 10 and 18-20 to be allowable and respectfully request that a Notice of Allowance to that effect be issued.

Claim 20 is rejected under 35 U.S.C. §103(a) as being unpatentable over Peltzer in view of Anderson and Wirtz as applied to Claims 9, 10, 18 and 19 above, and further in view of U.S. Patent No. 4,784,671 to Elbel (“Elbel”). Claim 20 depends from Claim 18 and Elbel fails to make up for the deficiencies of the combination of Peltzer, Anderson and Wirtz and also fails to teach or suggest all of the elements of the currently pending Claims. Accordingly, for at least those reasons given above for Claim 18, Applicant believes Claim 20 to be allowable and respectfully requests that a Notice of Allowance to that effect be issued.

Claims 11 and 12 are rejected under 35 U.S.C. §103(a) as being unpatentable over Peltzer in view of Anderson and Wirtz, and further in view of “Finite Element Modeling of Flow, Heat, and Mass Transfer in Fluid Saturated Porous Media”, Computational

Methods in Engineering 2002, by P. Nithiarasu, K. N. Seetharamu and T. Sundararajan (“Nithiarasu”). Claims 11 and 12 depend from Claim 1 and Nithiarasu fails to make up for the deficiencies of the combination of Peltzer, Anderson and Wirtz and also fails to teach or suggest all of the elements of the currently pending Claims. Accordingly, for at least those reasons given above for Claim 1, Applicant believes Claims 11 and 12 to be allowable and respectfully requests that a Notice of Allowance to that effect be issued.

Claims 1-23 are rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over Claims 1-39 of U.S. Patent No. 7,076,965 in view of Wirtz or, alternatively, Anderson. Without acceding to the outstanding rejections for obviousness-type double patenting, a Terminal Disclaimer over cited U.S. Patent No. 7,076,965 is being submitted herewith in order to expedite the allowance of this application and the Examiner is respectfully requested to withdraw the rejection.

Accordingly, Applicant respectfully requests that the Examiner issue a Notice of Allowance for all of the currently pending claims.

Should the Examiner believe that any further action is necessary to place this application in better form for allowance, the Examiner is invited to contact Applicant’s representative at the telephone number listed below.

The Commissioner is hereby authorized to charge to Deposit Account No. 50-1165 (T2211-11119US01) any fees under 37 C.F.R. §§ 1.16 and 1.17 that may be required by this paper and to credit any overpayment to that Account. If any extension of

time is required in connection with the filing of this paper and has not been separately requested, such extension is hereby requested.

Respectfully submitted,

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